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记山西榆社晚新生代鹿科化石两新种[1)]

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摘要 本文记述了山西榆社盆地晚新生代鹿科化石中的两个新种：*Eucladoceros proboulei* sp. nov. 和 *Procapreolus jinensis* sp. nov.，并列出了已鉴定完毕的所有产于榆社盆地晚新生代地层的鹿类动物化石单。

关键词 山西榆社，晚新生代，鹿科

鹿类化石是华北晚新生代中种类和数量都很多的一类大型哺乳动物，对于了解当时的生态环境、动物群交流等都有很大的意义。最近若干年(1985、1987、1988和1991)在邱占祥和Tedford的发起下，由中国科学院古脊椎动物与古人类研究所和美国自然历史博物馆组成的考察队在榆社盆地中采集到很多哺乳动物化石标本，其中一些化石经鉴定研究已做了系统记述和报道。新材料中的鹿科化石经笔者整理，鉴定出两个新种。其它材料正在研究之中，不久便可与读者见面。现先将这两个新种作一系统记述，以飨同行读者。文中所引用的地层划分据邱占祥等(1987)、Tedford et al.(1991)；牙齿形态构造名称据Dong(1993)。

鹿科 Cervidae Gray, 1821

鹿亚科 Cervinae Baird, 1857

真枝角鹿属 *Eucladoceros* Falconer, 1868

始布氏真枝角鹿 *Eucladoceros proboulei* sp. nov.

(图版I，图1)

特征 个体中等大小。角较粗壮，有4个或4个以上的枝。主枝粗短，略弯。分枝较长，略弯。各分枝与主枝间的夹角较小，在25度至40度之间。角的表面饰有粗宽的沟和棱。

正型标本 一件较完整的角(V10870)，但其第三、第四枝的顶端缺失。

模式地点 卢红沟(野外号YS115)

层位与时代 高庄组中下部，早上新世(相当于露西尼期)。

词源说明 因该种与布氏真枝角鹿相比既相似又原始，故名。

描述 全部材料仅为正型标本，1件保存了角柄、主枝及4个分枝基部的角。角柄中等长度，内缘长41mm。其横切面椭圆形，长轴长36mm，短轴长30mm。角环椭圆

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形，长轴约53mm。主枝粗短，以较直的方式从角环上伸出，主枝在各分叉点之间的部分较直。角在各分枝的分叉点向身体的后内侧方向折一较小的角度，即角的弯曲是以近似折线而不是近以曲线的方式进行。主枝第一段(第一分枝到角环间的部分)长50mm，其横切面近于三角形。第二段(第一分枝到第二分枝间的部分)长120mm。第三节长80mm。第三分枝与第四分枝(也可能是主枝第四节)的上部缺失，仅存基部，所以第三分枝和第四分枝(或主枝第四节?)的形态和度量不明。第一分枝长约120mm，与主枝间的夹角约为25度。第二分枝长约90mm，与主枝间的夹角约为40度。角的表面饰有粗宽的沟和棱。

比较与讨论 新种标本虽然保存不全，但显然有4个(也可能4个以上)分枝，无疑为鹿亚科，易于与三枝型角的类群(如新罗斯祖鹿、山西轴鹿、黑鹿亚属)相区分。与其它四枝型角的类群(如葛氏斑鹿、梅花鹿等)相比也显然不同。主枝较粗短、分枝较扁、分枝与主枝间的夹角较小、各分枝点间的距离较小等特征，和德日进等(Teilhard et al., 1930)订立的布氏真枝角鹿(*Eucladoceros boulei*)比较接近，但也存在着一些差异，如角的大小、主枝与分枝之间夹角的大小、角的枝数等。由于YS115地点的标本与所有在形态上相似的种类之间有明显的差异，所以将之订立为一个独立的新种。又因为它的大部分特征与真枝角鹿相同，所以暂将它归入真枝角鹿属。此外，角的分枝与主枝间的夹角

表1 始布氏真枝角鹿与新罗斯祖鹿、布氏真枝角鹿和山西轴鹿的形态比较

Table 1 Comparison between *Eucladoceros proboulei* sp. nov. and *Cervavitus novorossiae*, *Eucladoceros boulei* and *Axis shansius*

	新罗斯祖鹿 *C. novorossiae*	始布氏真枝角鹿 *E. proboulei*	布氏真枝角鹿 *E. boulei*	山西轴鹿 *A. shansius*
角冠形态 antler form	棘型 spur-like	棘型 spur-like	梳型 comb-like	竖琴型 lyrated
主枝相对大小 main beam	较小 small	较大 large	很大 very large	中等 medium
分枝数 tine number	3	≥4	≥6	3
分支点距离 distance between bifurcations	中等 medium	小 small	小 small	大 large
角饰 decoration	纵向沟棱 ridges, grooves	纵向沟棱 ridges, grooves	纵向沟棱 ridges, grooves	零星疣突 irregular nodes
角枝横切面 tine section	椭圆形 oval	扁平 flattened	扁平 flattened	圆形 round
产出层位 horizon	马会、高庄组 Mahui, Gaozhuang Fm.	高庄组 Gaozhuang Fm.	麻则沟、海眼组 Mazegou, Haiyan Fm.	麻则沟组 Mazegou Fm.

较小，枝干框架与新罗斯祖鹿(*Cervavitus novorossiae*)相似；其形态和大小以及地层层位上介于新罗斯祖鹿(马会组、高庄组，晚中新世至早上新世)和布氏真枝角鹿(麻则沟组、海眼组，晚上新世至早更新世，相当于维拉方期)之间，但更接近于真枝角鹿，因而推测它可能是这后两个种之间在系统演化上的过渡类群。新种与新罗斯祖鹿、山西轴鹿和布氏真枝角鹿的形态比较如表1所示。

据 Heintz (1970)，产于西欧的真枝角鹿有2个种：*E. senezensis* 和 *E.tetraceros*。它们与布氏真枝角鹿很接近，角冠的梳型特征很明显，个体比榆社标本大，各分枝也较长。

由于新种在形态特征上比布氏真枝角鹿原始，角冠近于棘型，各分枝在主枝上的排列呈亚梳型，它所代表的类群很可能是后者的祖先，所以将它命名为始布氏真枝角鹿。

美洲鹿亚科 Odocoileinae Pocock, 1928

原狍属 *Procapreolus* Schlosser, 1924

修订特征 1种小型的鹿类。角与狍相似，但第二枝为第一枝的三倍长；角的表面饰有纵向的沟棱，有时在角基附近有较多的小骨突。雄性个体具军刀状上犬齿。臼齿齿冠中等偏低，上臼齿具发育程度不等的马刺和原尖褶。四肢骨细，侧蹄仍发育。

晋原狍 *Procapreolus jinensis* sp. nov.

(图版Ⅱ，图2–4)

特征 1种小型的狍。角的表面饰有较发育的纵沟、纵棱和不规则的小瘤状骨突，角枝的横切面多为圆形。上臼齿原尖褶发育，马刺较弱；下臼齿主尖壁较薄。

正型标本 1件角基(V10880，采自 YS154a)。

归入标本 2件角基(V10881，采自 YS10；V10882，采自 YS22)，1件上颊齿列(V10883，采自 YS8)，一些下颌骨碎块(V10884，采自 YS11；V10885，采自 YS61)，一些单独的牙齿(V10886，分别采自 YS140、YS147、YS156 和 YS168)。

模式地点 贾峪村东南约1km处(野外号：YS154a)；

模式层位与时代 马会组中上部。晚中新世。

词源说明 该种首次发现于山西，故用其简称"晋"命名。

描述 角较小。正型标本(V10880)的角节较厚，由一些不规则的骨突组成。其横切面椭圆形，最大直径28mm，最小直径21mm。主枝较直，其横切面近于圆形，最大直径20mm，最小直径18mm。从标本的保存部分看不出角有无分枝和有多少个分枝。角的表面饰有较发育的纵沟、纵棱和不规则的小骨突。另2件标本(V10881 和 V10882)也是保存不完整的角基，在角环上方有一些小骨突。由于标本保存部分较少，也看不出角有无分枝和有多少个分枝。

上颊齿 标本 V10883 为1件保存完整的上颊齿列。颊齿排列呈较缓的弓形，前臼齿列的弧度较大，而臼齿列的弧度较缓。上颊齿列各牙齿的形态如下：

P2 牙齿冠面观近于三角形。原尖和后小尖相互融合。前尖和后尖清晰可辨。原尖内褶较发育，由3到4个釉质褶组合而成。牙齿舌侧没有纵向的内中凹。外齿带明显。

P3 原尖和后小尖、前尖和后尖分别相互融合，但仍可相互区分。原尖内褶不发

育，但仍明显。后小尖内褶较发育，由2个釉质突融合而成。舌侧的内中凹很弱。

P4 原尖和后小尖相互融合成一个较厚、较圆的尖。前尖和后尖也分别相互融合为一个相对较薄的尖。因此牙齿呈单叶型。原尖内褶发育，形如马刺。内中凹不存在。

M1 原尖褶弱而钝，位于原尖后棱的舌侧后方。后小尖褶弱而薄，位于后小尖前棱的舌侧前方。马刺较弱。前、内齿带较弱。内附尖不存在。齿冠磨蚀较深，故齿高较低。

M2 原尖褶明显、较厚。后小尖褶明显，但较薄。马刺明显，但较钝。前齿带较弱，主要分布在原尖前棱的前侧基部。内齿带较弱，在牙齿舌侧连续分布。内附尖不存在。

M3 原尖褶发育，其厚度大于原尖后棱，但长度小于后者。后小尖褶几乎不存在。马刺很弱。前齿带很弱。内齿带也很弱，但在原尖后棱基部略明显。内附尖不存在。

下颊齿 p2和p3没有材料。从3件不完整的下颌骨碎块来看，下颊齿的排列较直。

p4 牙齿仅有1件标本，其冠面磨蚀较深，故牙齿细节构造不清楚。从保存部分看，下前凹弱，与下三角凹、下内中凹和下跟凹一样向舌侧开敞。下后尖和下次中凹颇发育。

表2 晋原狍上、下颊齿测量数据(单位：mm；I=H/L*100)：

Table 2 Measurements on cheek teeth of *Procapreolus jinensis* sp. nov.

	长L	宽W	高H	指I
P2	9.32	9.10	6.02	64.59
P3	9.08	10.34	6.98	76.87
P4	7.00	11.18	6.66	95.14
M1	10.62	12.58	4.48	42.18
M2	11.08	13.48	6.58	59.39
M3	10.52	12.18	6.80	64.64
p2和p3没有材料				
p4	8.90	6.62	5.56	62.47
m1	11.10	7.26	6.10	54.95
m2	11.78	8.28	7.80	66.21
m3	16.42	7.70	8.90	54.20
上前臼齿列长 L P2-4			27.74	
上臼齿列长 L M1-3			31.10	
上颊齿列长 L P2-M3			55.90	
下前臼齿列长 L p2-4			26.50	
下臼齿列长 L m1-3			39.12	

3枚下臼齿的形态基本相近，都无古鹿褶。前齿带明显，外齿带较弱，无后齿带。外附尖小。主尖前、后棱厚而钝。m3在前两枚臼齿的两叶型基础上多1个第三叶。

晋原狍上、下颊齿测量数据如表2所示。

比较与讨论　晋原狍与产出层位相当的新罗斯祖鹿(*Cervavitus novorossia*, Teilhard et Trassaert, 1937)、吕氏原狍(*Procapreolus rutimeyeri*)和宽额原狍(*P. latifrons* Schlosser, 1924)比较接近。它们之间的形态比较如表3所示。

表3　晋原狍与新罗斯祖鹿、吕氏原狍和宽额原狍的形态比较

Table 3　Comparison between *Procapeolus jinensis* sp. nov. and *Cervavitus novorossia*, *P. rutimeyeri* and *P. latifrons*

	新罗斯祖鹿 *C. novorossia*	吕氏原狍 *P. rutimeyeri*	宽额原狍 *P. latifrons*	晋原狍 *P. jinensis*
角冠相对大小 antler size	中等 medium	中等 medium	较大 large	较小 small
分枝数 tine number	3	3	3	?
角枝横切面 tine section	椭圆 oval	近圆 roughly round	近圆 roughly round	圆形 round
角饰 decoration	纵向沟棱 groove-ridges	纵向沟棱 groove-ridges	纵向沟棱 groove-ridges	沟棱、小瘤突 ridge-nodes
颊齿相对大小 cheek teeth	较大 large	中等 medium	较大 large	较小 small
上臼齿马刺 pli cabaline on upper molar	一般 medium	发育 strong	?	较弱 weak
上臼齿原尖褶 pli protoconal	一般 medium	较弱 weak	?	较强 strong
下臼齿主尖壁 crista of conids	较厚 thick	较厚 thick	较厚 thick	较薄 thin

由于归入该种的角、上颊齿和下颊齿在保存中已相互分离，并采自不同化石点，因此在鉴定归类中困难较大。但这些标本中的角表面饰有很多不规则的小瘤状骨突，明显为狍类的特征而易于和其它鹿相区别。由于本文所记述的角仅保存基部，所以角的分枝情况如枝的多少、分支的角度等还不清楚。但这些标本保存部分较长，与狍类动物角的第一分支位置较高相符。其中的牙齿标本与现生的狍(*Capreolus capreolus*)比较接近。这些牙齿在度量上明显小于新罗斯祖鹿、吕氏原狍和宽额原狍，略小于现生狍。所以可将这些标本归入同一类中。另外从角和上、下颊齿标本数之间的比例来看，也较符合鹿类动物的埋藏特征。将它们归入同一类比将之按不同部位分为多类似更客观一些。由

于这些标本与其它狍类有所区别，所以将之单独订立为1个新种。但它们所代表的个体比其它已知的狍都要小，角上的瘤状小骨突不如现生狍发育，齿冠也低些，显然是1种较原始的狍，应归入原狍属。由于这些标本首次发现在山西，故用其简称"晋"命名这一新种。

原狍属(*Procapreolus*)为Schlosser于1924年根据产于内蒙古二登图的一类具三枝型角的鹿化石而订立的1个属。它包括2个种：吕氏原狍(*P. rutimeyeri*)和宽额原狍(*P. latifrons*)。它们的角和现生的欧洲狍相似，但角的表面没有小瘤状骨突。其后，Zdansky (1925, 1927)在他的有关中国鹿类化石的专著中将一部分产于山西榆社的三枝型鹿角化石归入了宽额原狍。但Teilhard et Trassaert, (1937)通过后来发现的一些标本作了更多的比较后指出，Schlosser所归类的产于榆社的宽额原狍应归入新罗斯祖鹿。经过比较，笔者同意后一种看法。如前所述，与狍属(Capreolus)相比晋原狍有较多的原始特征，应将之归入原狍属。但原狍属原来的属征中鹿角不具小瘤突，所以本文将原狍属的鉴定特征作一点修改，将角的特征补充为：有时在角基附近有较多的小骨突。

至此，在山西榆社盆地晚新生代地层中发现的鹿科化石已鉴定出的有如下一些种类：

布氏始柱角鹿 *Eostylocerus blainvillei* Zdansky, 1925

狍后麂 *Metacervulus capreolinus* Teilhard et Trassaert, 1937

姣后麂 *Metacervulus lepidus* Hu, 1962

双枝似麂 *Paracervulus bidens* Teilhard et Trassaert, 1937

短枝似麂 *Paracervulus brevis* Teilhard et Trassaert, 1937

湖麂 *Muntiacus lacustris* Teilhaid et Trassaert, 1937

矮麂 *Muntiacus nanus* Teilhard et Trassaert, 1937

山西新罗斯祖鹿 *Cervavitus novorossiae shanxius* Dong et Hu, 1994

小新罗斯祖鹿 *Cervavitus novorossiae minor* Dong et Hu, 1994

山西轴鹿 *Axis shansius* Teilhard et Trassaert, 1937

始布氏真枝角鹿 *Eucladoceros proboulei* sp. nov.

布氏真枝角鹿 *Eucladoceros boulei* Teilhard et Piveteau, 1930

扁角黇鹿 *Dama sericus* Teilhard et Trassaert, 1937

葛氏斑鹿 *Cervus* (*S.*) cf. *grayi* Zdansky, 1925

汤氏黑鹿 *Cervus* (*R.*) *trassaerti* (Shikama), 1941

东北马鹿 *Cervus* (*E.*) *elaphus xanthopygus* Milne-Edwards, 1867

双叉四不像鹿 *Elaphurus bifurcatus* Teilhard et Piveteau, 1930

吕氏原狍 *Procapreolus rutimeyeri* Schlosser, 1903

晋原狍 *Procapreolus jinensis* sp. nov.

东北狍 *Capreolus manchuricus* Lydekker, 1898

有关它们的系统描述及在地层中的分布情况的工作正在进行中。总之，榆社盆地所产的鹿科化石不论从种类还是数量上讲，都是非常多的。它们对研究鹿科化石的系统演化有很大意义。

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TWO NEW CERVID SPECIES FROM THE LATE NEOGENE OF YUSHE BASIN, SHANXI PROVINCE, CHINA

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Summary

Fossil cervids are a large group with many members and huge quantity in the Late Cenozoic faunae of North China. They are important for understanding of the evolution of paleofaunae, paleoecology and paleoenvironment. The fossil cervids in Yushe Basin were first reported and described by Zdansky (1925, 1927), and then Teilhard de Chardin and Trassaert (1937). In recent years (1985 — 1994), a Sino-American joint research team, led by Drs. Qiu Zhangxiang and R. H. Tedford, re-investigated the Basin and found a lot of new material. Here we present a description

of two new species and a preliminary list of the cervids found in Yushe Basin.

Cervidae Gray, 1821
Cervinae Baird, 1857
Eucladoceros Falconer, 1868
Eucladoceros proboulei sp. nov.
(Plate I, fig. 1)

Diagnosis A medium to large sized cervid. Antler is large in size with four or more tines. Main beam thick, relatively short and a little curved. The angles between the tines and main beam are small, between 25— 40 degree. The antler is covered with strong grooves and ridges.

Holotype and only known specimen, a nearly complete antler.

Type Locality YS115. (Lou Hong Gou)

Type stratum and horizon Middle and Lower Gao-Zhuang Formation, Early Pliocene.

Etymology For its similar but more primitive appearance with *Eucladoceros boulei*.

Description The material is a piece of antler with part of pedicle, complete burr and main beam as well as the base of tines. The pedicle is medium sized and measures 41mm long on its inner side. Its transversal section is oval, with maximal diameter of 36mm and minimal diameter of 30mm. The burr is oval too, with the maximal diameter of 53mm. Main beam thick and short, stretches straight out from the burr and then curved slightly backwards at each bifurcation. The first segment of the beam measures 50 mm long, with a rounded triangle section; the second segment measures 120mm long, and the third 80mm long. The part above the third bifurcation is not preserved. The first tine measures 120mm long, the second 90 mm. The third and fourth tines are not measurable. The angles between tines and main beam are small, between 25-40 degree. The surface of the antler is covered with strong grooves and bony ridges.

Remarks The present specimen has four or more tines, that distinguishes it easily from three tined forms as *Cervavitus novorossiae*, *Axis shansius*, etc. Compared with other four tined forms such as sikas, the present specimen shows a thick and short main beam, the angles between tines and main beam are quite small, the distance between the neighbouring bifurcations is relatively small and thus shows its speciality. The four or more tined antler with strong grooves and bony ridges is characteristic of Cervinae; the small distance between neighbouring bifurcations and the flattened tines are characteristic of *Eucladoceros*. But the present specimen is not lyrated formed and smaller than *Eucladoceros boulei*, and thus more primitive than the latter. Since the

present specimen appeared earlier than *Eucladoceros boulei* in geological time and is likely the potential ancestor to the latter, we nominate it as *Eucladoceros proboulei*.

Odocoileinae Pocock, 1928

***Procapreolus* Schlosser, 1924**

***Procapreolus jinensis* sp. nov.**

(Plate I, figs. 2— 4)

Diagnosis A small sized odocoileid. Antler is small, with round transversal section and covered with strong bony ridges and irregular nodes. The pli protoconal strong on upper molars while the pli cabaline weak. The walls between main cusps are relatively thin on lower molars.

Holotype a main beam (V10880) from type locality.

Other material two main beams (V10881, V10882), a range of upper cheek teeth (V10883), some fragments of lower jaws (V10884－10886) from other localities.

Type Locality YS154a (1km south－east of Jia－Yu Cun).

Type stratum and horizon Middle and upper Mahui Formation, Late Miocene.

Etymology For its first appearance in Shanxi, Jin is the abbreviation form of Shanxi in Chinese.

Description The antler is relatively small, with a thick burr composed with irregular bony nodes. The section of the burr is oval with maximal diameter of 28mm and minimal diameter of 21 mm. Main beam quite straight and its transversal section is nearly round with a diameter of 20 mm. The time of bifurcation and the number of tines are not clear due to the lack of complete specimens. The antler is covered with strong bony ridges and irregular nodes.

P2 is roughly triangle. The lingual side of the tooth is composed of one cusp (protocone), and the buccal side of two cusps, paracone and metacone. The pli protoconal is strong, the outer singulum too. While entoflexus absent.

P3 is quatratuberculous, but the protocone and metaconule on the lingual side of the tooth and the paracone and metacone on the buccal side are very close with each other mesia－distally that they seem almost fused together. Pli protoconal strong, while entoflexus weak.

P4 is uni－lobed. The protocone and metaconule are completely fused together, the same case is for paracone and metacone. The entoflexus no longer exist but pli protoconal is still strong.

All upper molars are quatratuberculous. The pli protoconal is very strong on M2 and M3. Pli cabaline is generally weak, as well as pre－and post－cingula. The endostyle nearly disappeared.

p2 and p3 are not available.

On the p4, preflexid, trigonid basin, entoflexid and talonid basin are all lingually open; metaconid and hypoflexid are quite strong.

All lower molars are similar to each other. Pli *Palaeomeryx* absent, cingulids weak, as well as ectostylid. The walls linking the main cusps are thin.

The measurments on the cheek teeth are given in the Chinese text.

Remarks The antlers among the present specimens are quite similar to the juvenile of *Cervavitus novorossiae*, *Procapreolus rutimeyeri*, but the irregular bony nodes on the present specimens distinguish them from the latter forms. The transversal section of the present antlers are quite round that is close to *Procapreolus*. The cheek teeth of the present specimens are obviously smaller than that of *Cervavitus novorossiae*, *Procapreolus rutimeyeri* and *Procapreolus latifrons*. The antlers and cheek teeth are all smaller than *Capreolus capreolus*. Judging from their capreoline characters such as irregular bony nodes on antlers, long segment above burr, the specimens could be grouped into the Capreolinae. Since their lower position in the strata and some primitive characters such as smaller size, low crown etc., it is preferable to attribute the specimens to *Procapreolus*. The difference between the present specimens and all known *Procapreolus* found in North China permit us to erect them as a new species. Because the specimens are firstly found in Shanxi Province, we use the abbreviation form of Shanxi, Jin as its specific name.

All identified cervid material found so far in Yushe Basin is listed at the end of Chinese text of the present paper. The taxonomic and phylogenetic study of these cervids is under way.

图版说明(explanation of plate)

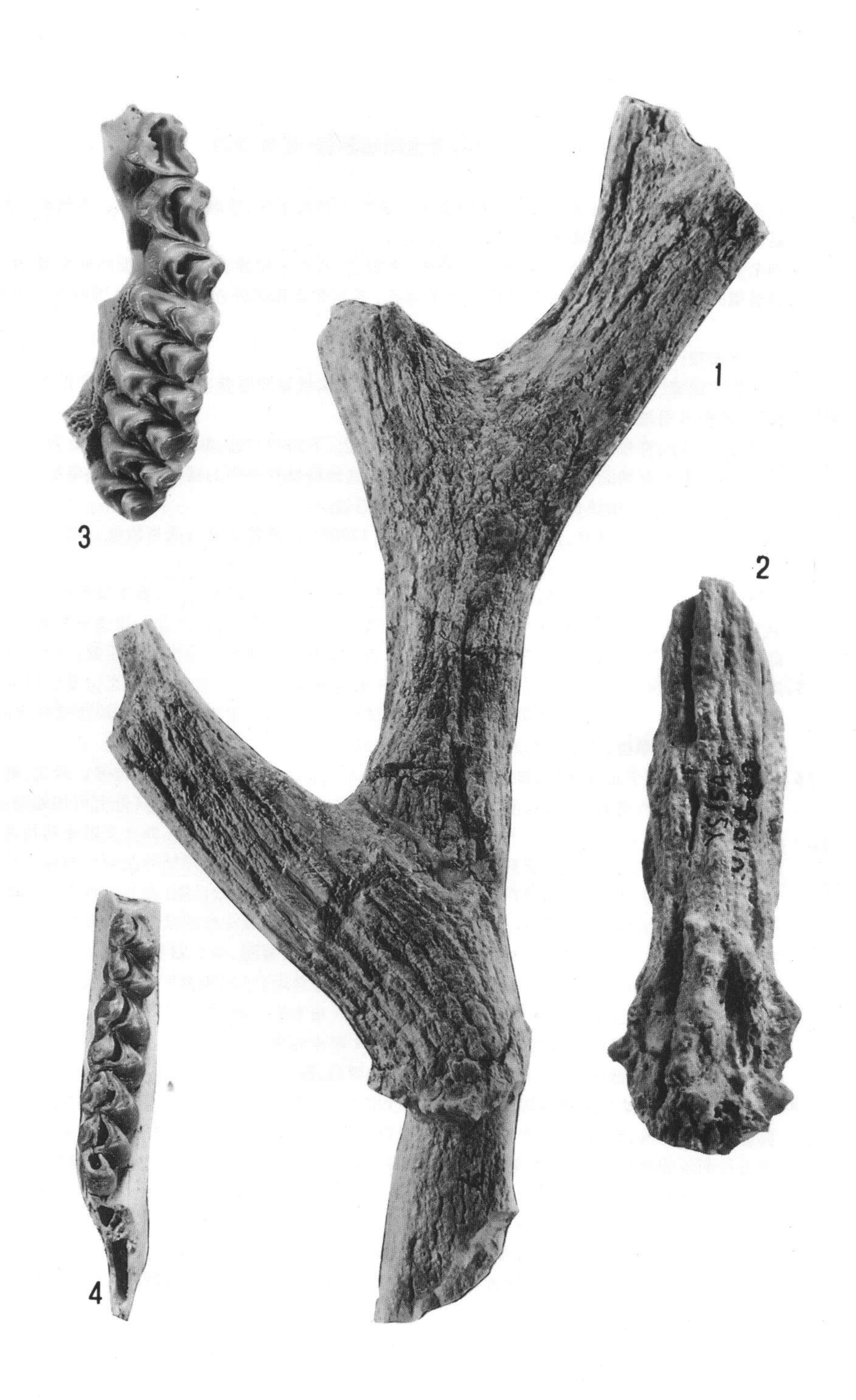
图版 I (Plate I)

始布氏真枝角鹿 *Eucladoceros proboulei* sp. nov.

1. 左角 left antler (V10870), × 1/2。

晋原狍 *Procapreolus jinensis* sp. nov.

2. 角 antler (V10880), × 1。
3. 左上颊齿列 left upper cheek tooth row (V10883), 嚼面视 occlosal view, × 1。
4. 右下臼齿列 right lower molar row (V10885), 嚼面视 occlusal view, × 1。


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